SHATTUCK (Geo. B.)

Influenza in Massachusetts.

The Shattuck Lecture.

THE SHATTUCK LECTURE.

INFLUENZA IN MASSACHUSETTS.

By GEORGE B. SHATTUCK, M.D.
OF BOSTON.

Read at the Annual Meeting of the Massachusetts Medical Society, June 10, 1890.

INFLUENZA IN MASSACHUSETTS.

Mr. President and Fellows of the
Massachusetts Medical Society:

As you well know the time-honored Annual Discourse takes place as usual to-morrow, on the last day of this meeting, just before the annual dinner, and is unquestionably looked forward to this year with all of the usual interest. That an additional claim should be made upon your time and attention this evening is an innovation, and as such requires some words of explanation.

At the annual meeting of the Society in the year 1858 the Treasurer reported that, "the Society has come into the enjoyment of the Shattuck legacy, amounting to $9,166.87, the income from which will contribute largely towards meeting the expenses of publication to which it is especially designated." Since that time this fund has remained with the Massachusetts Hospital Life Insurance Company, invested in one of that Company's annuity policies, and has yielded interest varying from 8.25% in 1866, during the period of inflation just after the war, which was the highest rate, to 4% which has been the rate annually during the last ten years. It appears from the Treasurer's accounts, as your present Treasurer kindly informs me, that until 1872 the income was expended for printing, binding and distributing the "Annual Communications." In 1872, however, the entire income is entered on the credit side of the funds as "loaned to the Massachusetts Medical Society." This arrangement was continued from year to year until 1877, when, the unusual necessities of the Society appar-

ently having ceased, the former use was renewed and the income again paid for printing and distributing the Medical Communications.

In 1878 a prize was offered by the Society for a prize essay, which was gained by Dr. Thomas Dwight by a very admirable piece of work on "Identification of the Human Skeleton"; and the income was devoted to the payment of the award and to the publication and distribution of this essay. During the subsequent years it has been expended as previously upon the annual Medical Communications, except in the years 1886, 1887 and 1888, when it was allowed to accumulate, and a prize of $1,000 was offered for competition at large for an essay worthy of a prize, "on the climate and its modifications as influencing health and disease, or on any of the diseases of the inhabitants of New England or on any kindred subject." This prize failed to excite the interest and stimulate the competition which was anticipated from the offer of so considerable a sum of money, with such a wide range of subjects, and no award was made. A result which emphasized observations elsewhere made as to the diminished zeal for the capture of prizes, whether baited with a round sum of money or with a long established reputation stamped upon a medal. The time when the possession of a Boylston Prize was the almost necessary passport to subsequent professional advancement and reputation in this immediate community is in a somewhat distant past. Perhaps the appearance on the scene of the professional prize-taker has had the same limiting effect as the professional influence has had in other contests. Be the reasons what they may, prizes seem no longer to attract as formerly.

In the years 1806 and 1807 no less than three of the Boylston Prize Medals were secured by Dr. Shattuck's pen, but in 1888 your committee came somewhat reluctantly to the conclusion that what our forefathers termed in 1807 the

"beneficent and laudable view of improving the art of medicine, and the excitation of practitioners to bring those talents to light which might otherwise be useless to the community," were not best subserved by the offer of prizes, and accordingly your Council in 1888 voted:

"That the Committee on Publications be instructed to provide for a lecture, to be called the Shattuck Lecture, on some subject in accordance with what is specified in the will of the late Dr. Shattuck, the lecture to be delivered at the annual meeting of the Society."

In accordance with this vote the Committee in charge proceeded to its execution, and, apparently, impressed with the feeling that it was not intended that only the sins of the fathers should descend upon the children, they appointed me to deliver the first Shattuck Lecture before the Society.

I confess I should have been very glad for your sakes and for that of the Lectureship had the choice fallen on a more competent person, but neither my appreciation of the courtesy of your Committee nor my respect for the memory of the benefactor, after whom the Lectureship is named, would permit me to decline.

You therefore see why it is that you are called upon to listen to a lecture on the evening of the first day of the annual meeting, as well as to the Discourse on the second day; I hope the process will not serve simply to increase your respect for the more carnal provisions of the Cotting Fund.

As the first to discharge the duties of this lectureship it may be thought proper and pardonable if I ask you to accompany me a little while in a further brief consideration of the circumstances which gave rise to its foundation, and of the scope of its functions, thus leaving a clearer field to the legitimate and more important duties of my successors.

The fund bequeathed by Dr. Shattuck to the Massachusetts Medical Society was one of three equal funds left

by his will to three different societies; the other two being the Massachusetts Society for Promoting Agriculture and the Massachusetts Charitable Mechanic Association. The provisions of the bequest in behalf of this Society were that it "should apply the net interest and income of the same from time to time, in the discretion of the Society, or of its government, to the collection and publication, annually, by some suitable person or persons, of historical or other essays on the climate of said Commonwealth, on the diseases of its inhabitants, and on such other subjects as the said Society or its government may select."

The bequest to the Massachusetts Society for Promoting Agriculture—the oldest incorporated society but one in this State— provided that "the net income of its fund should be applied from time to time, in the discretion of the Society or its government, to diffuse a knowledge of the proper admixture of soils, so as to raise the greatest quantity of food with the least labor and expense; to encourage the raising of trees for fuel and ship-timber; and generally to disseminate a knowledge of practical agriculture."

The bequest to the Charitable Mechanic Association provided that "it or its government should apply the net interest of the fund from time to time, at discretion, to encourage improvements in Architecture, and especially in the mode of constructing cheap and convenient dwellings for the poor, and also in defraying the expense of instructing mechanics' apprentices in the knowledge of the useful arts."

As has been shown by the hasty review of the uses to which this Society has put the income of its funds, the medical objects which the donor had in mind and at heart have been to a considerable extent realized. The Society for Promoting Agriculture, with a total fund of about $120,000, has done much for the farmer of the State of Massachusetts in improving the breeds of various domestic animals by the importation of foreign stock, and in other

ways has disseminated a knowledge of practical agriculture; but I cannot learn that it has caused studies to be made of the proper admixture of soils, so as to raise the greatest quantity of food with the least labor and expense, or has encouraged the raising of trees for fuel and ship-timber. The generation which has grown up to man's estate since this bequest was made has solved those questions for itself in a different but a very practical way—by moving West to the plains, and to the forests of Michigan and Puget's Sound; but even there at no distant date, if things go on as they have done, if there is no rotation of crops and unchecked forest fires, such information as Dr. Shattuck thought desirable for Massachusetts in 1854 may not be superfluous.

On the other hand, singularly enough, with the increased knowledge of the diseases of domestic animals and of their relation to those of man, and with the development of veterinary science, it has come to pass that this same Agricultural Society, through Drs. Peters and Ernst, is employing a portion of its income in an investigation of tuberculosis —a disease than which there is none more prevalent, none causing so many deaths in this State and throughout New England—and is thus doing work of a kind which thirty-five years ago could only have been expected to emanate from medical sources.

The Charitable Mechanic Association has hitherto, I believe, done little or nothing towards realizing the specific wishes expressed by the testator, and certainly nothing especial towards encouraging improvements in the mode of constructing cheap and convenient dwellings for the poor. But other agencies have in a certain measure brought about this very desirable end, and capital, philanthropy and hygiene have all found a remunerative account therein.

From the last annual report of the trustees of the Peabody homes for the poor in London, in which especial attention

was given to sanitary construction, it appears that the birth rate in these homes is 8.72 per 1000 above the average, the infant mortality is but a little over half the average, and the total death rate is 1 per 1000 below the average. Yet these buildings pay a moderate per centage upon the amount invested, although their construction can hardly be called cheap. Here in Boston there are now numerous tenement houses, which fairly deserve the name of apartment houses, occupied by poor people, where the sanitary conditions are good, the standard of health is high, there is no overcrowding, and which pay fair returns to the owners. There is also a Coöperative Building Association which aims to secure the ends sought for in this legacy, and thus indirectly lowers the death rate of the city.

These bequests were not large—even for the day in which they were made, certainly not for ours—and were individually smaller than others proceeding from the same source, but they were eminently characteristic of the man, eminently indicative of his interests during life and of the direction which his hopes for the future took. He was not a sentimentalist, but nothing human was foreign to him; he was at home with all sorts and conditions of men, he had a constant interest in and sympathy for humanity. He knew the farmer, he knew the mechanic, he knew the homes of the poor. His father, a graduate of Harvard, a man of large frame and powerful physique, spent his strength as a country doctor in the last century, going on horse-back over the hilly regions of the northern part of Worcester County, succumbed to the exposure and labor of his profession at the early age of fifty-one years, and leaving his son an orphan at the age of eleven years. Hence, he knew too what it was to make one's own way; he knew—to use his own quaint expression—the value of the "healthy stimulus of prospective want," but he also knew the value of encouragement and of a helping hand held out at the right moment.

He himself graduated at Dartmouth College. As a medical student part of his time was spent at the University of Pennsylvania, where he took his degree in 1807. He obtained a knowledge of country practice by studying with Dr. Amos Bancroft in Weston, and of city practice in connection with Dr. Danforth in Boston. He had previously received a medical degree from Dartmouth, and subsequently a third medical degree from Harvard. So that, although not having studied abroad, his medical education was for that time a broad one.

While in Philadelphia, as his letters written from there show, he undoubtedly came under the influence, to some extent, of Dr. Benjamin Rush, who was then at the height of his reputation as a teacher, and who was a large figure in the Society of the time, and he was one of comparatively few from this neighborhood who came directly in contact with Rush. Of Rush, Dr. Holmes said, addressing this Society in 1860:[1]

"If I wished a student to understand the tendencies of the American medical mind, its sanguine enterprise, its self confidence, its audacious handling of Nature, its impatience with her old-fashioned ways of taking time to get a sick man well, I would make him read the life and writings of Benjamin Rush. Dr. Rush thought and said that there were twenty times more intellect and a hundred times more knowledge in the country in 1799 than before the Revolution. His own mind was in a perpetual state of exaltation, produced by the stirring scenes in which he had taken a part, and the quickened life of the time in which he lived. It was not the state to favor sound, calm observation. He was impatient, and Nature is profoundly imperturbable. * * * * * * * Dr. Rush must have been a charming teacher, as he was an admirable man. He was observing, rather than a sound observer; eminently observing, curious even about all manner of things. But he could not help feeling as if Nature had been a great deal

[1] Currents and Counter-Currents. Annual Meeting, May 30, 1860.

shaken by the Declaration of Independence, and that American art was getting to be rather too much for her—especially as illustrated in his own practice. He taught thousands of American students, he gave a direction to the medical mind of the country more than any other one man, perhaps he typifies it better than any other. It has clearly tended to extravagance in remedies and trust in remedies, as in everything else, etc. etc."

Dr. Weir Mitchell, his fellow-townsman, on the other hand (A Commemorative Address delivered at the Centennial Anniversary of the Institution of the College of Physicians of Philadelphia, 1887), says of Rush:

"With reverent doubt of my powers to do justice to the greatest physician this country has produced, I approach the task of recalling to your memories the vivid and emphatic personality of Benjamin Rush. His life invites a less hasty biographer, and is full of such seeming contradictions as can only be explained by the belief that the earnest, decisive, and mutinous nature of a man, proud rather than conceited, got the better of the principles by which he honestly strove to guide his conduct. * * * * How shall I briefly bring before you the career of this restless being? Relentless energy drove him through a life in which ardent sense of duty, large-minded philanthropy, love of country, devotion to his art and its science, immense belief in himself, were the motives to industry. * * * * He was a statesman, a scholar, an army surgeon, a punctual and careful physician, an actively religious man, a far-seeing and courageous philanthropist, and a sanitarian far in advance of his day. These are what I might call four careers in all of which he excelled, unaided by secretaries or modern means of condensing and regulating labor; one such suffices most men."

Dr. William Pepper, another Philadelphian, says of Rush:[1]

"Rush was evidently a perfectionist. His enthusiasm over the possibilities of human nature continually breaks

[1] Address delivered before the American Medical Association, June, 1889.

out into expressions of sincere exuberance. I fear he drew his inspirations more from the experience of his own nature, refined and elevated, which required no excitement but the claims of duty, and no pleasure but the pursuit of knowledge and truth, than from the observation and study of men as they actually exist.

"The truth is that Rush was at all times and in all places and before all else a great physician. He had entered public life from a sense of patriotic duty; he had labored for the improvement of society because he was irresistibly impelled by his large humanity; but he threw himself into the service of medicine with passionate intensity. Ramsay, a favorite pupil and intimate friend, tells us that Rush wrote to him: 'Medicine is my wife, science is my mistress, books are my companions, my study is my grave.'"

Dr. Shattuck shared to some extent the tendency of his day to polypharmacy; he did not eschew remedies of large bulk, he did not always think it necessary to stoop to tickle the palates of his patients, he had confidence in medicines, as he had in other methods of interfering with disease, and used them with courage when he thought interference necessary. But I do not think, in his case and in that of many others in New England of whom he was a good type, that this was so much because he thought "there were twenty times more intellect and a hundred times more knowledge in the country in 1799 than before the Revolution"; so much because he "felt that Nature had been a good deal shaken by the Declaration of Independence, and that American art was getting to be too much for her"; in other words so much due to the influence of the teaching of Rush —as it was due to a mental and moral inheritance typical of his time. His father, as has been said, had carried on a guerilla warfare with disease over the hills and valleys of Worcester County for twenty-five years, until he fell before it himself; his grandfather, a farmer, at the age of sixty-five shouldered his gun and followed the British on the 19th of April, 1775, from Lexington to Cambridge, having

previously marched from Littleton; and his great-grandfather, also a Harvard graduate, was an Orthodox clergyman whose life was a contest with false doctrine, with the flesh and the devil. This was not a paternity for a contemplative offspring, for an expectant generation, for a hand-folding philosophy. It was in the blood to be up and doing, to wrestle with some antagonist and to strive to prevail over him; whether the antagonist took the form of a vigorous climate, of depravity of the spirit, of unjust taxation or of weakness and error on the part of the flesh. It was just possible for the strong men of that generation to sit down and see nature lead, but not to restrain themselves from pursuing and taking hold of her when she led us it seemed to them astray. It was their duty to *smite* the Philistine, not to leave him to the chances of the slow corrective influence of time.

The self-determining power of the will, which had accomplished much in the preceding two hundred years, had not abdicated in the early part of this century, nor yet had it adopted the gentle disguises of Christian Science, of the mind cure or of hypnotism. Bad medicine was good for disease, as self torture was good for the erring. *We* take both our religion and our medicine more comfortably and less seriously. But then he who took a distasteful remedy had placed his comfort as a precious sacrifice upon the altar of health. The nose of the patient as of every one else must be kept to the grindstone.

It was felt that the doctor's duty was to stand between the patient and the disease, but not *always* with the apothecary at his side, as appears from old letters of Dr. Shattuck's which have been preserved. A young clergyman, whose first vigor was spent, is sent on a horseback journey with a companion. Another clergyman, whose delicate wife was suffering in 1825 from some early form of tuberculosis, is advised: "If your wife can conform to rule in

diet and exercise and exposure she may be restored. If the trammels are too galling to her free agency she slackens the progress of the cure and renders her situation still precarious. Let her case terminate as it may I feel that I have honestly intended her service. I am sorry that instinct rather than reason governs one so elevated among the national tribes." And a year later, after the death of this patient who lived at a distance: "I became quite convinced when I learned her impatience under the use of the only earthly means that could serve her (viz., warmth, rest, diet, good nursing, with the healing hand of time) that she could not attain health more."

To a College Professor, who asks as to his probable future health and ability to continue in the discharge of his duties, notwithstanding an impaired constitution, Dr. Shattuck wrote in 1826: "Your diet, wearing apparel, exercise in the open air, warmth and ventilation of your apartment, bathing (medicated, warm and shower), attention to an easy state of bowels, and attention to a wholesome variety in your intellectual labor and to a healthful alternation between labor and rest, are in my opinion adequate remedies to secure you the possession of a working power equal to all the duties of your professorship. I would underwrite at a less rate at this time on your continued life and power to labor ten years to come, than I should have felt justified in doing it at when you were here a year ago."

In another letter of advice I find the following: "You must turn Quaker, and remain silent; give your lungs rest and they will recover. After all, careful nursing is the most essential to you, pediluvium, friction, diet, &c."

Yet such expectancy, such appreciation of the *circumfusa* and *ingesta*, such recognition of self-limitation proceeded from the same pen as: "Enquire of Mussey his opinion of the expediency of maintaining over your entire chest a pustular eruption for at least two or three months"; or as a

prescription for a thousand pills, three pills every day for a year,—a prescription the remembrance of which was treasured up unto the detriment of the third generation when applying for a hospital appointment. A compound prepared with unauthorized elegance for a rich and influential client at his request, found its way out of window instead of down the patient's throat, and the genuine stuff was procured and submitted to. It is evident that the patient was held in view for treatment quite as much as the disease. Yet, when he wished to endow a professorship at the Harvard Medical School, it was a chair of Morbid Anatomy, not of Materia Medica and Therapeutics, which was selected.

It is true that civil commotion stirs up thought and quickens mental activity; but, in spite of this, I am constrained to believe that the remote influence of Calvin had quite as much to do with the best of medical practice during the first half of this century in New England, as had the immediate teaching and example of Rush.

At the time the bequest which gives rise to this lectureship was made, the study and description of disease as exhibiting itself in this Commonwealth and in New England was in some ways easier and in some ways more difficult than at the present time. There was a much more homogeneous population, habituated to its surroundings and to the climate. The pursuits were less varied, the effects of competition and nervous strain less great. There was less crowding and less movement of individuals to and fro. There was less division of medical practice; there were more doctors, I think I may say—at least at the centres of population—who knew *all* about more people than now, and not merely about one member of a family or perhaps only about one organ of one member of a family. The trusted physician in the city was then, as is happily still the case in some parts of the country, the adviser, not merely the prescriber, for the family; he was in many ways the guide, the coun-

sellor, the friend. His memory and his note books furnished something nearer the theoretical bureau of domestic anthropometry than anything we have at present.

On the other hand there were lacking the abundant facilities for rapid exchange of medical thought and observation all over the world which exists now; and there were lacking altogether or only existing in a small way, the three great sources for the study of the development, the course and the variations of disease in a given population, viz., boards of health, hospitals, and a trustworthy registration of vital statistics.

The Massachusetts Hospital was the only hospital for general diseases in New England; our State Board of Health was not started until 1869, and the Registration of vital statistics, which has been enlarged and improved in recent years, was first undertaken by the State in 1842 and was much less perfect than now.

Under the circumstances, therefore, which existed in 1854 and the immediately preceding years, there was a *raison d'être* and a promise for utility in a bequest like this of Dr. Shattuck's, such as perhaps would not suggest themselves, at least not with as much force, to-day. Certainly to one who was fond of and somewhat sanguine about the compilation of facts and figures; who for many years was President of the American Statistical Association; who was a friend and supporter of Lemuel Shattuck—one of three Commissioners, as Dr. Walcott reminded you last year, appointed in 1849 under the authority of this Commonwealth to make a sanitary survey of the State—to such an one the objects for which he designated this bequest, must in the early fifties have appealed with peculiar force.

Every well regulated hospital may be regarded as a post-graduate school whose courses, if rightly followed, should make some additions to the reliable records of clinical observations and to the sum total of the knowledge of

disease, in its neighborhood at least. In comparison with the single hospital thirty-five years ago, one finds—in addition to the large City Hospital of Boston, the Carney Hospital at South Boston, and to all the small incorporated special hospitals doing an admirable work in this city—that Lowell has two hospitals, one organized first as a Dispensary (?) in 1840, the other incorporated in 1867; Lynn one hospital, opened for patients in 1883; New Bedford two, one opened in 1873, the other in 1885; Cambridge one, incorporated in 1871, and opened for general patients in a new building in 1886; Newton one, opened in 1886; Newburyport one, opened in 1884; Haverhill one, opened in 1882; Salem one, opened in 1874; Quincy one, opened in 1890; Taunton one, opened in 1889; Fall River one, opened in 1888; Worcester, a City Hospital, opened in 1871, and a Memorial Hospital opened in 1888; Clinton one, opened in 1889; Springfield, a City Hospital since 1879; Pittsfield, a hospital since 1884; North Adams one, opened about the same time. In addition to these already opened and at work, plans are under discussion for hospitals in Malden, Marlboro' and Plymouth.

With the growth and enlargement of some of these Hospitals, which the future is sure to bring, why may not fresh contributions be expected from their physicians as to the effect of locality, of certain occupations, of certain race admixtures upon health and diseases. The introduction of the Celtic element, which went on so vigorously during the middle third of this century, has had, as we all realize, an enormous influence upon the vital statistics of Massachusetts; the effect of the French Canadian and the Italian immigrations will probably be less, but just what the future alone can show. The race admixture at the Boston City Hospital is already so marked that a smattering of several foreign languages is by no means an unnecessary qualification on the part of those in attendance, and the behavior of

the Latin race under disease offers a marked contrast to that of the Anglo-Saxon.

You are all aware how much our State Board of Health has done for and through the profession in its annual publications in regard to the subjects provided for in this bequest; with increased liberality on the part of the State its work is constantly increasing. As a new progressive step you will be glad to know there is in contemplation the appointment of a salaried inspector, whose duty it shall be to investigate and report on the causes and conditions of local epidemic outbreaks, in the manner in which this has been done by such men as Ballard, Buchanan, Thorne and Radcliffe, in the service of the English Local Government Board. Here is a field of honorable medical ambition for the right men.

The registration of vital statistics has now been carried on long enough in this Commonwealth, is now sufficiently accurate and is compiled with such care as to make it of great service in any relative study of the past and present of diseases here. The statistics accumulated by the immense extension of life insurance, and the meteorological records of the United States Weather Bureau are other advantages of which the student can make use to-day. So that, notwithstanding the decreasing homogeneity and the increasing density of population, notwithstanding the complexity of pursuits and the exaggerated wear and tear of life, the task of one who seeks to investigate the climate of the Commonwealth and the diseases of its inhabitants is certainly simplified in some important particulars—at least over the time, not so long distant, when the inquirer's main resource was a slow and precarious correspondence by letter with brother practitioners.

INFLUENZA.

Some such thoughts undoubtedly occurred to many when the recent pandemic of influenza swept over the world. It seemed positively churlish to deny hope the impulse to spring once more eternal in the medical breast. With the aid of the telegraph and the submarine cable; of rapid transit by sea and land; of numerous weekly medical publications as well as of the daily press; of the facilities for collective investigation afforded by the frequent meeting of medical societies in Europe and the United States, by the machinery of central bureaus and local boards of health with mortality rates and registration of returns; and above all with the aid of the entirely modern bacteriologist armed with his immersion lens, his culture tubes and his staining preparations—was it not legitimate to hope that, if with the coöperation of all these more or less modern appliances we searched out the secrets of Nature faithfully, we should be able to penetrate a little farther behind her mysteries in this particular disease? Was it not legitimate to trust that we should be able to bequeath to the future something more than we have received from the past, should at least definitely determine some of the doubtful points which presented themselves after the preceding pandemics to puzzle or ensnare the Sydenham Society, and Sir Thomas Watson and Hirsch and other sources of previous wisdom? In short that we should be able to say to our successors something more than that an "influence" coming from we knew not whence, disappearing we knew not whither, and making a large proportion of mankind ill we knew not why, had afflicted the world at a certain date? It is now more than six months since the influenza made its appearance as an epidemic in Western Europe, and more than four months since it ceased to be epidemic in this Commonwealth.

In Berlin, in Munich, and in Paris, Committees of Medi-

cal Societies, aided by Government, and in London the Local Government Board, have been at work upon Collective Investigations of the epidemic; the Munich Committee's returns were to be in March 15th, and the Berlin Committee's returns March 21st. The results have not yet reached us, though their probable tenor in each country may be guessed at from the reports of Society meetings, and communications to Medical Journals, all of which I have reviewed. I have been struck with the re-appearance of the same questions arising to perplex observers in turn in all affected regions; with the inevitable tendency to make the disease fit the limited observation of the individual; with repeated proofs of the strength of the temptation to construct a theory upon what passes before one pair of eyes. I even think papers in Medical Journals will show that men who inclined to the explanation of contagion found a larger percentage of enlarged spleens than men who held to the miasmatic theory!

The time which has elapsed is not sufficient for the record and comparison of observations and experiences in different parts of the world; the distance from the pre-occupations caused by the rapid succession of crowded days is not sufficient to afford the necessary perspective for so extended a field.

I shall ask your attention then, during the time which remains, to a brief consideration of some points in regard to Influenza as exhibited in the last epidemic in Massachusetts. My own interest in the subject is derived from the experience of a large hospital service, of private practice, of personal illness in Boston, and of a general experience in Paris—all within the space of six weeks, from the middle of December, 1889, to February 1st, 1890, and of a pretty careful review of the old and recent literature of the subject since the cessation of the epidemic.

So quickly do events succeed each other in our age and so

rapidly are the scenes of life shifted, I do not doubt that to some of you the subject seems already old and threadbare. I fear I cannot offer a sure key to any of its mysteries, and I may not tell you anything new, and I may weary you; but I shall, at least, protect myself from a repetition of the comment of an esteemed colleague who, when asked lately about a certain address before a Medical Meeting, exclaimed: 'Oh! you know what it was like, some quotations from scripture, and not a word about medicine!"

ORIGIN.

Where did the Influenza have its origin, where did it come from? Europe first heard of it in Russia, where it was reported as epidemic about the middle of last October—hence it has frequently been spoken of since as the Russian Influenza;—a designation given for the same reason in several previous epidemics. At the same time that influenza exhibited itself in epidemic form at St. Petersburg (60° N. Lat., 30° E. Long.), the middle of October, it was also active at Tomsk, 1800 miles to the eastward in Siberia (56° N. Lat., 85° E. Long.). A severe epidemic is reported[1] to have run its course in Bokhara, a district of Chinese Tartary (40° N. Lat., 85° E. Long.), between the end of May and August, 1889. This is really about all the information which we have on the subject of origin up to date. For affording trustworthy epidemiological data the heart of Asia is about what it was in the middle ages or at the time of the Garden of Eden, and, although further time for corrected returns from these outlying districts may possibly produce something less vague, the probability is that our successors will learn from us as to the origin of this epidemic what we have learned from our predecessors as to some others—"that it came from the East."

Present information indicates that the *epidemic* began in

[1] Prof. Drasche, Wien. Med. Wochschrs. No. 6, Feb. 8th, 1890, p. 219.

Berlin the middle of November, in Hamburg about the first of December, in Leipzig about December 10th, in Cologne December 1st, in Paris November 26th. (November 26th was the date of the outbreak at the great Louvre Stores). In Southern Germany, in Austria, in Turkey it was later. In Wurzburg and Munich it began about the middle of December; in Vienna, December 12th; Pesth, December 15th; Belgrade, December 16th; Bucharest and Sophia, December 24th. To the north of Paris, it began at Brussels December 12th, and Antwerp December 16th. At London it began the end of December; Madrid, December 14th; Malaga, December 12th; Lisbon, December 21st; Alexandria, December 25th; Cape Town, first week in January.

INFLUENZA IN MASSACHUSETTS.

Our State Board of Health has again justified the position which it has made for itself, by sending out promptly in January circulars to physicians, public institutions, and factories and employers throughout the State, thus providing for a Collective Investigation of this epidemic within the borders of Massachusetts. The board has very courteously allowed me to look over and collate the replies which have been received, and I am therefore enabled to give you more extended results than would otherwise have been possible, in anticipation of the Board's Annual Report.

The Secretary, Dr. Abbott, will work over these same returns for the Board's report; but it is not amiss that returns as complicated and as difficult of interpretation as these are should be handled independently by more than one individual, that possible errors or prejudices may be modified, on one side or on the other.

The following is a copy of the circular. Those sent to physicians and public institutions were the same; those sent to factories and employers varied as indicated in questions

numbered 1, 3, 4, 5 and 6. The question in regard to sex is somewhat ambiguous.

COMMONWEALTH OF MASSACHUSETTS.
Office of State Board of Health,
13 Beacon Street, Boston,
JANUARY, 1890.

DEAR SIR:—

In view of the general epidemic of influenza now prevailing, the State Board of Health desires to obtain such information as is possible regarding its appearance in Massachusetts during the present season, and therefore respectfully requests a reply to the following questions:

1. What was the date of first appearance of the epidemic in your neighborhood? (or institution?) (or among your operatives?)
2. In what week was it most prevalent?
3. What estimated proportion or percentage of the population in your community was attacked? (or of persons employed by you?)
4. What ages or periods of life were most affected?
5. Which sex was affected most severely?
6. What was the average duration of the attack? (or length of absence from work?) in days.[1]
7. What symptoms predominated in the cases under your observation?
8. What other diseases were increased in frequency or severity simultaneously with the epidemic of influenza?

MANUFACTURER'S CIRCULAR.

4. What proportion or percentage were obliged to leave their work in consequence of such illness?
5. What was the average duration of the attack?
6. Which sex was affected most severely?

Respectfully yours,
SAMUEL W. ABBOTT,
Secretary.

From physicians 192 replies were received; from Public Institutions, 24; from factories and employers, 178 replies were received.

[1] In the Mercantile Circular Nos. 4, 7 and 8 were omitted.

PUBLIC INSTITUTIONS—SUFFOLK COUNTY.

The returns from nine of the principal hospitals of Boston, including the Marine Hospital at Chelsea and the Boston Lunatic Hospital at South Boston, cover about 2000 people, and indicate that the epidemic began in these institutions about December 21st, and was most active during the week from December 28th to January 4th. The City Hospital reports the earliest first case occurring December 16th, the New England Hospital the latest first case occurring December 23d. The McLean Insane Asylum, Somerville, reports the smallest percentage of inmates affected, viz.: 10%. With 336 inmates there were 34 cases, of whom 16 were male and 18 were female; only two patients were attacked, the other 32 cases being among the attendants or employees. The New England Hospital for Women reports the largest percentage (75%) of inmates affected. At the Children's Hospital 75% of officers and employees were attacked, and only 33% of the patients; adults reported as somewhat more susceptible than children. At the Adams Nervine Asylum 45% of the inmates—30 out of 65—were attacked; at the City Hospital 25% of the patients and 25% of officers and employees. At the Massachusetts Hospital, Dr. Pratt writes: "it seemed at one time that every one resident in the Hospital had symptoms of the disease," and nurses and attendants were especially victims. At the State Prison, Charlestown, 40% of the inmates were attacked, the first December 21st; and Dr. Sawin writes, "there was not a single case of pneumonia at the prison, although I saw many cases in private practice"; on the other hand, 8% of those affected had diarrhœa, and bronchitis was as usual frequent.

Conclusions.

As to dates these returns agree pretty well with those of the mercantile companies, and those of the doctors, with

the natural difference that these first cases are reported, as a rule, a few days later. Of seven reporting the percentage of patients attacked, the average is 41%. I do not feel justified in drawing any positive conclusion as to sex. There is nothing which appears positively to indicate exposure to the atmosphere or contagion as a factor, unless in the case of the McLean Asylum, where only two patients were attacked, and of the Massachusetts Hospital where the attendants suffered more, one infers that the attendants were more out of doors. At the City Hospital, on the other hand, the percentage of the two classes was equal; and in regard to the Children's Hospital, where 75% of officers and employees suffered but only 33% of patients, it is to be remembered that children were in general less susceptible to influenza.

Of these institutions, the City and Massachusetts Hospitals are the only ones reporting pneumonia as a complication of or sequel to influenza.

PUBLIC INSTITUTIONS—OUTSIDE OF SUFFOLK COUNTY.

Outside of Suffolk County, 12 public institutions reported, of which five are Insane Hospitals, one (at Tewksbury) an almshouse, and the others are schools or reformatories. Danvers is the most easterly and Northampton the most westerly point represented, and, strangely enough, each reports its first case as occurring on the same day, December 25th, and, contrary to what might be expected, the epidemic reached its height at Danvers Lunatic Hospital as late as the third week of January, whereas at the similar Northampton institution it culminated the second week of January; at Danvers 30% were attacked, but at Northampton only 10%.

The Tewksbury Almshouse (North Middlesex), with its constant receipt of inmates from Boston, reports the earliest first case, December 18th, only two days later than the first

case of the Boston City Hospital; the Primary School at Monson (East Hampden) and the Lyman School for boys at Westboro' (West Worcester) come next with December 19th, although the Homœopathic Insane Hospital at Westboro' and the Massachusetts Reformatory at Monson do not report their first cases until December 22d and December 26th respectively.

The latest first cases occurred at the Lancaster State Industrial School (Worcester) and the Worcester Insane Hospital, at each January 3d, but the most active week at the former was the third week of January, and at the latter the second week. The Taunton Insane Hospital (Bristol) reports its first case December 30th; the State Farm, Bridgewater (Plymouth), December 31st; but the culminating week at the former was the third week of January, and at the latter the second week.

The epidemic reached its height a week earlier at the Primary School at Monson than at the Lyman School, Westboro', last week of December and first week of January respectively, although it first appeared at both on the same day. The largest percentage attacked was at the Primary School, Monson (56%); the smallest percentage (5%) at the Worcester, and the next smallest (10%) at the Northampton Insane Hospital. The Lyman School for boys reports 50%; the Lancaster Industrial School 42%; the Reformatory Prison for Women, Sherborne, 40%; the Tewksbury Almshouse 40% of its officers, and 33% of its inmates.

The Danvers Hospital, with 30% of inmates attacked, reports an intercurrent epidemic of measles with nine cases, and one of erysipelas with six cases; there were a few committals in which the exciting cause seemed to be influenza; the senile were less frequently affected by influenza and females more than males. At the Westboro' Hospital "more females were attacked, but the worst cases were males";

at the Worcester Insane Hospital more males were attacked. The Women's Prison, Sherborne, is the only institution specifying insomnia as a complication. Only four of this group report pneumonia as a complication or sequel.

Conclusions.

In the reports of these 12 institutions it certainly does not appear that geographical position was an important factor as influencing the date of the first case or the maximum week. How far contagion could have had an influence we have no data to decide; all these institutions are on more or less frequented lines of travel and all receive inmates from the outside world.

The letter[1] accompanying the report of the Lyman School for Boys, Westboro', taken alone, suggests contagion. No very definite conclusions can be drawn as to the matter of sex.

The average per cent of the affected at eleven institutions reporting was 32%, compared with an average of 41% in Suffolk County.

MERCANTILE AND MEDICAL RETURNS.

Returns were received from 178 manufacturers and mercantile houses, representing all the counties of the State except Dukes and Nantucket. Of these I have tabulated 142, leaving out those which for one reason or another seemed too vague or unreliable. It cannot be said that all those, by any means, which have been included are entirely trustworthy; some are evidently more careful than others; but on the whole, perhaps, the errors to some degree tend

[1] "The first case was a teacher in one of the Schools who had charge of thirty boys. About December 14th she spent a day in Boston, and was taken ill December 19th, recovering in four days. In about five days the boys in her school began to be sick, and 28 had the disease in some degree within two weeks. I should say all were taken sick within one week and before the disease appeared in any other school. The disease then invaded the nearest school, and in a few days had reached all of the six which make up the institution. Out of 190 boys, 132 had the influenza."

to correct each other. I have endeavored to compare these returns from manufacturers with each other and with those from the doctors throughout the State, of which 192 were received and of which I have tabulated 179. I fear the success as to results is not proportionate to the amount of labor involved, but such as it is I will ask your attention to it.

Beginning with south-eastern and eastern counties, I will pass to the western counties in order.

Nantucket County.—This Island County, standing with its neighbor Dukes alone as outposts in the Atlantic, sends only medical returns, for the good reason that manufactures do not exist. There are five medical returns from the town of Nantucket and vicinity. One places the first case December 20th, and the maximum week the first week of January; the other four range the first case between December 30th and January 4th, three make the third week of January the maximum week and one the second week.

Three think males were more affected, and two females. One reports pneumonia as increased, and two pulmonary diseases. The only return as to proportion of population affected states 25%.

Dukes County.—From this Island County also there are only medical returns; here, as at Nantucket, the population lives mainly by the sea.

There are five returns. The earliest first case is reported from Vineyard Haven on the north shore December 25th, but this was one of several exotic cases brought in by the Revenue Cutter Gallatin, and another return from the same place dates the first native case January 2nd; the other three returns from Edgartown, Cottage City and West Tisbury date the first case January 1st; three returns, giving

a maximum week, name first, second and third weeks of January; these same returns give 20%, 33% and 66% as the proportions of population affected. Average 40%. Two returns state that males were more affected, and one that females, "because males had greater power to throw off the disease quickly." One return gives pneumonia and one pulmonary diseases as increased.

Conclusions.

The returns from these island counties indicate that influenza invaded them two weeks later than the mainland farther east. In the winter months they have comparatively little communication with the mainland; the population is thus less exposed to contagion, though freely open to atmospheric effects, especially those coming from the eastward across the Atlantic.

Before drawing the obvious conclusions in favor of contagion and against atmospheric miasm, I ask your attention to two interesting letters.

Dr. Banks, Surgeon Marine Hospital Service, writes from Vineyard Haven, Jan. 25th:—"Dec. 25th I treated seven cases, seamen landed from the Revenue Cutter Gallatin which put in here in consequence of this trouble with her crew.[1] This is the first record I have of the appearance of the epidemic here, and shortly after I was seized with an illness of a like character. . . . . .

"In this connection, as showing the undoubted atmospheric influences in the propagation of the disease, read a report similar to mine comprising 17 cases on the Revenue Cutters[2] Woodbury and Dallas at Portland, Me., which occurred on board these vessels while at sea attending to their duties in cruising along the coast."

Dr. Luce writes from West Tisbury, Jan. 31st:—"I first

[1] Abstract of Sanitary Reports, January 3rd.
[2] " " " " 17th.

observed the epidemic during the spring of 1889, when it appeared in its greatest severity during the months of March and April. It was not then epidemic in the State, so far as I know. I should think that at this time about one third of the inhabitants were affected. . . . It was most frequent among males, especially among fishermen and those exposed to inclement weather. The symptoms in this epidemic were principally referable to the respiratory organs.

"The present epidemic began about the first of January and is still upon us, affecting fully two thirds of the population. In some instances the schools have been closed, so many of the pupils were affected. It affects all ages, but is principally confined to males.

"The symptoms are more variable than in previous epidemics. I think I recognize three different forms of the disease. (1) Bronchial, or catarrhal. (2) Febrile, with a second rise in temperature after the drop in several cases. (3) Neuralgic.

"I have seen only one case of supervening pneumonia, and that was in the spring epidemic. I have seen in connection with the present epidemic four cases of herpes zoster, more than I have seen here before in many years. Influenza seems to be a common disease here."

Dr. Lane writes also from Vineyard Haven: "There was no evidence of its being communicated by or from one person to another, even when occupying the same room or bed through severe cases lasting two weeks."

Barnstable County furnishes only one manufacturer's return, and that from a shoe shop at Orleans on the arm of Cape Cod. The first case occurred January 14th, the greatest prevalence was during the fourth week of January, 33% of 66 employees were attacked and absent from work on an average of four days. The return of the doctor at

Orleans, on the other hand, reports the first case as occurring in his neighborhood on December 27th, the greatest prevalence during the first week of January, 33% of the population as affected, males the most severely affected, and pneumonia as increased.

Medical Returns.

From physicians in Barnstable County there are fifteen medical returns from eleven towns, all the way between Truro on the northeast arm of the Cape to Sandwich at the southwest border. At Truro the first case is dated January 1st, and the greatest prevalence the last week of January; from Wellfleet, ten miles away, the first case is reported November 20th, and the prevalence the third week of January; Chatham, December 22d and the second week of January; Harwich, January 1st and second week of January; Brewster about the same; West Dennis, December 20th and second week of January; but South Dennis December 1st and first week of December. Of two reports from Hyannis, one places the first case December 10th, the other December 25th. Of four returns from Sandwich, one places the first case October 6th, two December 20th and one December 27th; one gives the first week of January as that of greatest prevalence, two the second week, and one the third week; one reports 50% of the population of Sandwich as mildly affected and 12% severely, another 30%, and another 25%.

Conclusions.

The greatest percentage of affected (75%) is reported from Harwich, West Dennis and Osterville; the least percentage (10%) from South Dennis; of the two reports from Hyannis one gives 10% as affected, and the other 25%. The average of thirteen towns is 37%.

Sex.

The only point which can be fairly well established from the Barnstable medical returns is, that males were more severely affected than females, and probably—as one doctor puts it—"because they were more exposed to the weather." Ten out of fifteen report "males," two females, one is doubtful, one says no difference. From Sandwich one return says "males," one says "females," one "rather more females," and one says "no difference." So that, on this point, Sandwich remains in doubt.

Other Diseases.

Six returns from this county report pneumonia as increased, and four pulmonary diseases.

Bristol County.—I have tabulated 13 manufacturer's returns from Bristol County covering about 7000 employees. Of these three are from New Bedford, six from Fall River, three from Taunton—all in the southern half of the county—and one from Attleboro' near the northern border.

The earliest first case, December 14, is reported from Attleboro' at the north, but two mills at Fall River report first cases December 15th; the latest first cases are at Fall River and New Bedford—the southern extremity, but in close railroad communication with Boston—each January 6th; the largest mill at New Bedford, however, reports its first case December 31st, and the third mill January 1st.

The three returns from Taunton agree substantially upon December 30th as the date of the first case. All the returns, except one from Fall River which names the last week of December, agree practically upon the second week of January as the maximum week.

The percentage of affected varies from 60% to 5%, the average being 29%; the absence from work an average of five days.

The superintendent of the Granite Cotton Mill at Fall River writes a letter of some interest under date of February 4th:

"The influenza made its appearance among our people December 27th, the day after the great gale which swept over the Eastern States. December 30th, when the temperature fell from 54° F. to 37° F., the number of victims increased rapidly, and reached a crisis a few days after January 1st, when there was another fall in temperature from 36° to 20°, followed by a cold wave, which those who dressed in holiday attire and engaged in New Year's festivities were not prepared to meet, and the number of victims continued to increase until January 13th, when a large percentage returned to work, and since that time the number of those off work has steadily decreased, and to-day there are only seven cases among 836 employees."

The treasurer of a cotton mill at Taunton, 1200 employees, sends very accurate figures, from which it appears that of 650 males, 221 were sick, an average of 4.73 days; and of 550 females, 259 were sick, an average of 5.95; so that at this mill the females were sick in greater numbers and more seriously.

Medical Returns.

I have tabulated seven medical returns from this county, all from the southern half of the county, except one from Attleboro'. The earliest first case is, December 10th, from New Bedford; the latest first case, December 28th, from Fall River near by. The next earliest case is from Attleboro', at the northern part of the county, December 18th. All the returns, except one, which gives the first week in January, name the second week of January as the maximum week.

The percentage of affected varies from 60% in Attleboro' to 10% in Fall River. Average 33%.

Sex.

Three state that males were most affected, one females.

Other Diseases.

Four returns state that pneumonia was most increased in frequency.

Conclusions.

I think we may conclude from the two classes of returns in this county that influenza was at least a week later here than in Boston (Suffolk County), and that where males and females were equally withdrawn from out-door exposure the females suffered more.

From Plymouth County there are only three factory returns, all three from shoe shops in Brockton and its neighbor Campello, in the northwestern corner of the county. These returns cover nearly 1000 employees.

The answers to question 1 are January 1st, 2d and 10th; to question 2, the 3d of January, the second week and the third week; that the climax was not reached any earlier in the shop where the first case occurred January 1st, than where it occurred January 10th. The percentages of affected were 60%, 20%, and 40%; and the days of absence from work 2, 7 and 5. The sexes are returned as affected alike.

Medical Returns.

There are four from Plymouth County. From Abington the answers to questions 1 and 2 are December 4th and the week from December 29th to January 4th; from Brockton the answers to 1 and 2 are December 20th and second week in January; to question 3 this return gives 50% of the population as attacked. From Middleboro', farther south, the first case is reported as occurring on the same day as at Brockton, and the climax as occurring the same week, but only 10% of the population was affected.

From Rockland, the next township to Abington, the first case is set down for December 22d, eighteen days later

than the first case at Abington; the climax, however, was reached about the same time in the two towns; at Rockland only 6% is returned as attacked.

Three of the four answer the male sex to question 5; two specify pneumonia, and one pulmonary diseases as being increased.

Obviously no definite conclusions can be drawn from the returns from this county.

The case in Abington December 4th was probably antecedent to the true epidemic; and the epidemic perhaps began a little later and culminated a little later than in Suffolk County.

From Norfolk County five factory returns, one silk, one woolen, one cotton, one straw, cover from 1500 to 2000 employees. The earliest first case is December 16th, the latest December 28th; in two returns the climax is reached the first week in January, in two the second week in January, in one the week January 4 to 11.

The silk factory reports 60% of affected and of absentees an average of 5 days; the straw factory 50% of affected and 20% of absentees, an average of 3 days; the woolen mill 15% of affected and 10% of absentees, an average of 4 days; the cotton mill 6% of affected and 3% of absentees, an average of 3 days. The first case at the woolen mill in Dedham was December 16th, and the first case at the cotton mill at Readville in the next township was December 25th, but the period of greatest activity at each was the first week in January.

Medical Returns.

There are thirteen from Norfolk County, representing twelve different towns. West Medway at the western border of the county reports a first case as early as October 20th—evidently a sporadic case of catarrhal fever; Hingham

near the coast, and just north of Abington with its first case December 4th, reports its first case November 15th; 12 "distinct cases" are reported as occurring in Brookline November 17th—perhaps a local outbreak; Stoughton, on the southern border of the county and contiguous to Brockton with its first case December 20th, reports a first case November 20th; Dedham's first case is returned for December 12th; of two returns from Hyde Park, one gives the first case as December 7th, the other December 27th; the Medical Examiner at Brookline gives the date of the first case there as December 15th; the first case at Foxboro' is the latest—December 25th. East Weymouth gives December 21st; Braintree and Randolph (next to Stoughton with its first case November 20th) give December 20th. Eight towns return the first week in January, or the week from December 28th to January 4th, as the week of greatest prevalence. Two towns, West Medway with its first case October 20th, and Hingham with a first case November 15th, report the second week of January as the week of greatest prevalence, which indicates pretty well the character of the so-called first cases. The return from Hyde Park which dates the first case December 7th, puts the climax at the fourth week of December; that from Quincy which dates the first case December 1st, puts the climax the first week in January, the same week as those dating the first case December 20th. At Braintree and Wellesley Hills 75% of the population is said to have been attacked; various percentages are given for the other towns between this and 20% for Hingham and 15% for Brookline at the other end of the scale. The average is 51%.

Sex.

Eight returns from as many different towns specify the male sex as having been most severely affected. The others make no return to this question, except one which states that the female population was the larger.

Medical Returns.

Seven returns state that pneumonia was increased, and three others that pulmonary diseases were increased. One return mentions capillary bronchitis in connection with pneumonia.

Suffolk County, the next on the north, is really the City of Boston with Chelsea; from the small towns of Revere and Winthrop, also within the county limits, there are no returns.

There are seven returns from the large Boston dry goods stores. One places the first case as early as December 1st, but reports the same week of greatest prevalence (December 28th to January 4th) as another store which reports the latest first case of the seven, December 22d. Two date the first case December 10th, one December 16th, one the 20th. Four give Christmas week as the climax, but this is partially explained by one return which says: "Our employees were lightly touched, and there were no more absences than usual at Christmas time which is always the cause of much fatigue." Two stores return 50% of employees as affected and 45% as absent in consequence; one returns 50% as affected but only 5% as absent—a singular discrepancy; one, 33% as affected and 25% absent; one, 10% affected and absent. The average duration of absence varied from 2 to 7 days. Two stores report the male sex as most seriously affected.

There are returns from nine banks and Trust Companies. Among the personnel of two banks no case of influenza occurred. One dates the first case December 10th, one December 13th, one December 16th, one December 17th, one December 20th, and one the 27th. The large banking house with 44 employees reporting its first case December 13th, gives the second week of December as the week of greatest

prevalence; 60% were attacked and 45% were absent—an average of four days. If this is a correct statement, and there is every reason to accept it, it indicates that the epidemic exhibited an almost explosive character at this point.

A Trust Company, with 26 officers and clerks, dating its first case December 17th, gives the immediately following week as that of greatest prevalence.

Two banks report 75% of affected with 25% and 20% of absentees; one, 50% with 33% absent; one, 33% affected and absent; one, 25% affected and absent. The average of absences varied from three to six days.

At the Trust Company with 26 employees, three had a second attack incapacitating for work; and "the oldest" of the staff are reported to have had immunity.

These bank returns, dealing with comparatively small numbers under immediate supervision, are probably pretty reliable. They indicate that the influenza began as an epidemic in Boston about the middle of December and was on the wane by January 4th; that at least 50% of the young and middle-aged male population was attacked, and that about 25% was incapacitated for work for four or five days.

The return of the Central Boston Post Office, where there are 472 employees (clerks), dates the first case December 15th, and the week of greatest prevalence December 28th to January 4, which corresponds pretty accurately with the hospital and medical returns; 29% were said to be affected, 22% were incapacitated and absent an average of four days; male employees were most severely affected, but only 25 women are employed.[1]

[1] In response to my request, separate returns were made up for the letter carriers, 155 in number at the Central Station, who were naturally more exposed in the open air than clerks in the building. The week ending December 10th, a daily average of 6.34% were absent from duty, December 19th, 6.14%; December 27th, 6.64%; January 4th, 10.32%; January 12th, 11.67%; January 22d, 9.48%; January 30th, 10.19%; February 8th, 10.44%. The percentage of daily absentees nearly doubled from the week ending December 19th to that ending January 12th. The maximum week was apparently a week later than among the clerks.

The North End Station of the Boston Gas Light Company employs 320 men, and dates its first case December 27th, and its week of climax is given as the first week in January; 55% were attacked and 18% absent an average of three days. The Superintendent writes a somewhat interesting letter, to the following effect:

"At the South Boston works, where thirty men were employed, the first case appeared December 28th, and it prevailed unceasingly the first three weeks in January; 64% of all men were attacked, and all were obliged to leave work about four days. The last case was cured January 24th. Men who worked at the fires and were subjected to heat and chill, and men of sedentary habits were attacked. Every man in the retort houses and all the office men had it, while only one street laborer, and none of the yard men were attacked."

The Whittier Machine Company of the Roxbury District, employing 261 men, presents a singular return: its first case was December 22d, the week of climax the first in January, only 4½% were attacked and only 2½% absent an average of seven days. The Chelsea Dye House had its first case December 5th, its maximum week the fourth week in December, 40% of its 92 employees were attacked and 35% absent an average of seven days.

The average percentage of affected in eight mercantile houses in Boston, employing males, almost exclusively, is 50%.

Medical Returns.

There are twenty-three from Suffolk County—all from Boston except one from Chelsea—which I have tubulated.

One first case is reported December 1, one December 5th, three December 12, but in each of these returns the maximum week is given as the last week in December. The Chelsea return dates the first case as late as December 25th and the maximum week the first week of January.

The latest first cases returned from Boston proper are those dated December 20th. The greatest number of returns (five) giving the same date for the first case are for December 17th, and there are three giving December 16th. It would be fair to assume the middle of December as the date of the beginning of the epidemic in Boston. Ten returns give the last week of December as the maximum week, three the week from December 28th to January 4th, and three the first week of January. It is probably fair to assume that the epidemic began to decline in Boston about the end of the first week of January.

It took, therefore, ten or twelve days to reach its climax, where it held probably five or six days.

One return from Charlestown District gives 80% as the proportion of the population attacked, one from Brighton 75%, one from Roxbury 70%, two from Boston proper 65%, two 50%—these must be estimates or guesses. One return says 44% of persons in families visited, one 25% in families visited. The lowest percentage from Boston proper is 20%, and the lowest of all, from Chelsea, 17%. The average is 44%.

Sex.

Of those answering question No. 5 as to sex, five say male, three female, one "happened to be female in my practice."

Other Diseases.

Twenty-three state that pneumonia was increased (one specifying fibrinous pneumonia); one states that pulmonary diseases were increased; one mentions gastritis; only one specifies insomnia as a complication. In the practice of one there was a general immunity from other diseases during the latter part of the epidemic. The mention of bronchitis is so usual in all these returns that I omit it.

As to the question of sex or exposure in the open air, two

correlated factors as it seems to me elsewhere, it is difficult to draw any definite conclusions from the medical returns of Suffolk; but it is pretty evident that pneumonia was increased.

Essex County.—Extending along the coast and immediately to the north of Suffolk, I take up Essex County next.

I have tabulated 16 returns from manufacturing companies, etc., in this county, and 21 medical returns from 14 different towns.

A Lynn shoe shop (the only one reporting on account of the fire), with 210 employees, reports its first case January 1st, and its maximum week the second in January; the first case at the Lynn Bank was December 28th.

From Beverly, two shoe shops, each employing about 300 men, report. One says its first case was "about November," its maximum week the second week of December, 90% of the employees were affected and 75% were absent an average of ten days. The other reports its first case December 20th, its maximum January 1st; 50% were attacked and absent an average of four days. These shops are very near each other, and it is impossible to reconcile the two statements unless we explain the first by a "strike" rather than by influenza.

From Salem, a Bank reports its first case December 21st; five out of six were affected; but the Naumkeag Cotton Mills at Salem, with 1078 employees, reports the first case "about January 1st," the maximum week January 4 to 11, 40% attacked, 13% absent an average of five days. The Ipswich Cotton Mills, 552 hands, same date for the first case, January 11 to 18 for the maximum. Two mills at Newburyport, employing together 580 hands, report first cases January 3rd and 4th, maximum weeks January 4 to 11 and the second week of January; 25% and 43% of affected and absent an average of seven days.

A Haverhill shoe shop, with 400 employees, reports its first case December 20th, its maximum week December 28th to January 4th, 75% affected, 25% absent. From Lawrence there are two returns. Of the Great Pacific Mills, with 4336 employees, very full, accurate and reliable returns may be found in the Boston Med. and Surg. Journal, Vol. cxxii. p. 251, to which reference will be made later.

The first case at the Pacific Mills occurred December 24th, the maximum week was January 4th to 11th, 40% were affected and absent an average of 6½ days, females were the most and the most seriously affected.

The Pemberton Cotton Mills of Lawrence, with 676 employees, report the first case December 17th, the maximum week January 4th to 11th, 41% were affected (lost time in consequence) and out an average of $5\frac{4}{10}$ days; females were most attacked, 49% of the females and only 29% of the males. The report from this mill also is apparently accurate and reliable, and agrees in the main with the Pacific report.

A linen mill at Andover, 308 employees, reports first case December 14, maximum week second week of January, 41% attacked, 38% out. A machine shop at North Andover, 421 hands, all males, December 25th, January 5 to 12, 40% attacked and out five days.

Medical Returns.

One return from a coast town (Newburyport) and one from an interior town (North Andover) date the first case December 1st; but the return from Andover, next to North Andover, dates the first case December 21st, and gives the maximum week as the second week of January, and the other return from Newburyport names January 1 to 15 as the maximum period, so that these early cases may be considered sporadic as similar ones have been in other counties.

The latest returns of first cases are from Marblehead and Manchester on the coast and Methuen in the interior, all

January 1st; the maximum week at Methuen is given as the third in January, at Manchester January 5 to 11.

Lynn returns December 15th; Peabody December 10th, with a maximum in the second week in January; Danvers one return December 15th, one December 25th, with the third and second weeks of January as maximum weeks respectively; Gloucester December 18th and 24th, both returns naming January 5 to 11 as a maximum week; Haverhill December 20th and 28th, with the first and second weeks of January respectively as maximum weeks.

West Newbury next to Newburyport gives December 16th as the date of the first case.

Lawrence December 20th, December 20th, December 23d, with the first week of January as a maximum week for the first two, and January 7 to 21 for the third return.

Georgetown, in the northwestern corner of the county, gives December 16th as the date of its first case, and the middle of January as the maximum period.

The percentages of population attacked range from 80% in Marblehead to 5% from one return from Haverhill, the other return from Haverhill giving 33%. One return from Danvers gives 60%, the other 10%; one return from Lawrence gives 50%, one 25% and one 12%. The return from Andover says 50%, that from North Andover 15%. The average of twenty returns is 38%.

Sex.

Eleven returns specify the male sex in answer to question 5; three returns say females, but in one of these the practice is among females.

Other Diseases.

Eleven returns state that pneumonia was increased, three specify catarrhal and one croupous pneumonia. Four state that pulmonary diseases were increased. Two mention gastro-intestinal disorders as complications. A Medical

Examiner reports two deaths without treatment, "probably from congestive pneumonia." One return from Lawrence states that influenza "drove out" diphtheria which had been prevalent.

Middlesex County.—This county, lying next to Essex and Suffolk, brings us back from the northern border of the State to the neighborhood of Boston. It is almost wholly an interior county, and, except for a small though thickly-populated territory around Boston, we take leave of the immediate influence of the sea. It is a manufacturing population. I have tabulated 27 returns from factories, banks, machine shops, &c.

From Lowell, in the northern part of the county, seven returns cover nearly 9,000 employees. The Lowell Cotton Mills, with 1,736 employees, report the earliest first case December 20th, with a maximum week the same as that in Boston, viz.: December 28th to January 4th. The Merrimac Woolen Mills report the latest first case January 10th, with a maximum week the second week of January; there are three first cases December 26th; one, December 30th; two, January 1st: four mills give the second week of January as the maximum week, two mills January 4th to 11th, one and the Bank (only five employees) December 28th to January 4th.

The percentages of the affected and absent, at the mills in Lowell, varied very much, according to these returns, from "nearly every one" affected, and 50% absent an average of four days at the Merrimac Cotton Mills and Print Works, to 10% affected and 8% absent an average of four days at the Merrimac Woolen Mills. The favorable return, if accurate, from the Merrimac Woolen was probably due to something other than wool, for the Middlesex Woolen Mills report 50% affected and 20% absent an average of five days.

The different departments of the same mill were as differently affected as the different mills. To this point I shall revert again later. Five days was about the average of absence from work.

Sex.

As far as the Lowell returns offer any reliable information upon that point, the female sex was the most affected. Careful calculations from the Merrimack Cotton, with 3200 employees, in answer to a personal request, show that influenza "was more prevalent among women and boys than among men."

The Pepperell Cotton Mills, 316 employees, in the northwestern corner of the county and somewhat off the main line of travel though with railroad connection, report the first case January 9th, and the maximum week the third week of January.

The North Billerica Cotton Mills, nearer Boston than Lowell and on the main line of travel, with 265 employees, report the first case "about January 1st," and the maximum week the third week in January. Next to the south, a tannery at South Woburn, 180 employees, has its first case October 4th, its maximum week the second week in October, 6% attacked and 5% absent an average of thirteen days—evidently a local predecessor of the great epidemic, for a Winchester factory a few miles away and still nearer Boston reports its first case December 26th, its maximum week the first week of January. The Malden Rubber Shoe Company, 1255 employees, with dates agreeing pretty closely with those previously recorded in Suffolk County, had only 15% attacked and 12% absent an average of five days. The returns from manufactories in Cambridge, Watertown, Waltham, Newton, covering 4200 employees, vary but little from those given for Suffolk County, but the first cases are a few days later and the maximum weeks a few days

later. The Nonantum Worsted Company at Newton, 520 employees, reports its first case December 30th, its maximum week January 4 to 11, 17% of affected and absent an average of five days.

The Waltham Watch Works, 2300 employees, reports males as most affected. Returns from two shoe shops at Marlboro', 1100 employees, report first cases December 22d and 26th and the maximum week the first week of January and January 4 to 11; from woolen mills at Maynard, 886 employees, the first case was December 20th and the maximum week January 4 to 11, Marlboro' and Maynard are in the western part of the Middlesex near the Worcester line.

Medical Returns.

I have tabulated 26 medical returns from this county. Beginning again with Lowell near the northern line, there are two returns, one placing the first case December 10th and the maximum week the second week of January, the other December 21st. Billerica returns the first case December 12th and the maximum week the second week of January; from Ayer in the northwest, near the Worcester County line, the Medical Examiner of the District, Dr. Hartwell, returns the first case as December 21st and the maximum week the second week in January. He writes: "I go into four or five adjoining towns. Ayer is a large railroad centre. The epidemic began here and reached its height from one to two weeks earlier than in places off the line of travel, and, as far as my observation goes, affected a larger number of the inhabitants.

"The only case I saw as Medical Examiner was one in Pepperell, said by the neighbors and thought by Selectmen to have died from influenza, but proved on examination to have died of acute alcoholism."

Returns from towns around Boston—Somerville, Med-

ford, Melrose, Arlington, Cambridge, Waltham, Lexington, Concord, Newtonville, Newton—though varying considerably in the dates of first cases, and still more so in different returns for the same towns (Cambridge, for instance, returning November 15th, 24th, December 1st, 23rd, as dates of the first case), agree on the average with the Boston returns, as do those also of the date of the maximum week. Returns from Framingham and Hopkinton in the southwestern corner of the county agree as to dates with those from Boston.

The percentage of the affected varies from 75% in five returns to 10% in two returns. It also varies within these same limits for different returns from the same place. The return of the Medical Examiner resident at Somerville estimated 75% of the population attacked, another return from Somerville names 10% as proportion. The average percentage of 24 returns tabulated is 44%.

Sex.

Fifteen returns specify the male sex as suffering either most numerously or most severely. Of these, one reads: "Males who were most exposed to weather and hard work"; one return says: in numbers females suffered more; in severity, sexes alike; one return says: more cases among females, more complications among males; one return says: females more frequently attacked, in the proportion of 3 : 2.

Other Diseases.

Eleven returns state that pneumonia was increased, and eight that pulmonary diseases were increased; one return states that there was less pneumonia than usual; one reply affirming an increase of pneumonia expresses doubt whether "the pneumonia had any direct connection with the influenza, or whether it was an independent disease attacking those already debilitated"; and another reply is accompanied by

this comment: "Most cases of so-called pneumonia following influenza are in reality cases of congestion, not croupous pneumonia." Another return states: "no diarrhœa, no constipation, no diseases increased in frequency or severity."

A member of the Board of Health of Lowell writes: "Scarlet fever, which had been rapidly increasing for four weeks, with the first week in January (the maximum week of influenza) suddenly decreased, and the same is true of diphtheria, though in a less degree." This coincides with a return from Lawrence previously alluded to.

Worcester County.—This county occupies the heart of the Commonwealth and stretches across it from north to south. Though studded with manufacturing towns, it has a larger agricultural population proportionately than the counties previously considered. It may be regarded as a more homogeneous area than such counties as Barnstable or Bristol or Essex or Middlesex. I have tabulated 27 returns from manufacturing companies, banks, &c., covering 11,405 employees.

The returns indicate that the epidemic affected Worcester County in general later than those counties we have already gone over to the east of it. The earliest first case is returned from Clinton, the Bigelow Carpet Works, December 16th, but the maximum week was the second week of January, and the Lancaster Mills at the same place reports the first case December 26th, with the same maximum week; West Upton reports a first case December 21st, but as a maximum week the third week in January, and a factory in the contiguous town of Grafton reports its first case January 9th, with the third week of January also as the maximum week. A shoe shop in Worcester reports a first case December 23d, and a maximum week January 4th to 11th; but the first case at the Bank which reports was December 30th, and at the Loom Works, 500 em-

ployees, January 1st; a Worsted Company in Fitchburg reports its first case December 20th, but its maximum week the second week of January; and another company in Fitchburg dates its first case January 1st, and its maximum week the third week of January. Fourteen first cases are dated between January 1st and 10th, and the others in the last days of December. Eight returns give the third week of January as the maximum week, and fourteen the second week; one gives the fourth week.

The percentages of those attacked vary from 60% to 5%, and of those absent from work from 60% to "very few"—that is, less than 5%.

The Cotton Manufacturing Company of West Boylston, with 226 employees, reports "only one case and that early in January." The average absence from work was between five and six days.

Medical Returns.

I have tabulated 16 medical returns from 13 different towns. The earliest first case, December 15th, is from Grafton, where the manufacturing company dated its first case January 9th, but the maximum week was the second week of January. Five returns—one each from Westboro', Worcester, Clinton, and two from Fitchburg—date the first cases December 20th; the other returns vary from December 22d to January 3rd—this latter another return from Fitchburg. Ten returns name the second week of January as the maximum week, and four the third week.

The estimates of the percentage of population affected vary from 90% to 10%. Of two returns from Worcester one says 90% and one 50%; of three returns from Fitchburg one says 65%, one 25%, one 10%; the Medical Examiner at Gardner, near Fitchburg, estimates 80% for his district. The average is 48%.

Sex.

Twelve reply males, and two females.

Other Diseases.

Twelve say that pneumonia was increased, one that pulmonary diseases were increased, and one that whooping cough was more fatal.

The next belt of the State to the westward may be regarded for our purposes as made up of three counties, Hampden, Hampshire and Franklin—in that order from south to north. The centre of these counties is traversed by the rich farming lands of the Connecticut River Valley, and the abundant streams from the hills are utilized for manufactures.

Hampden County.—I have tabulated twelve returns from factories and banks in this county, employing between four and five thousand people. A Springfield Bank and a Holyoke Bank (the only banks sending returns) report "no sickness"; the Holyoke Blanket Company reports, "few sick at any time and did not interfere with work"; and the Germania Mills (Cotton), Holyoke, report "no loss of time from influenza"; but two thread companies at Holyoke report first cases December 24th and 26th, and the second week of January as the maximum week. A Firearms Manufacturing Company at Springfield, 213 employees, reports its first case January 1st, its maximum the second week of January; 10% affected, 5% absent an average of nine days.

No return from this county gives any earlier maximum week than the second week of January; but there is a report of a first case from near Palmer, December 18th, one from Ludlow a little farther west, December 20th, one from Chicopee—again a little farther west—December 24th, but the other return from Chicopee gives January 1st as the first case.

There are some apparently more than usually accurate and interesting returns from a Duck Company at Palmer in the eastern part of the county, employing 325 hands. The first case in the dressing shop is reported December 30th, and the maximum week the second week in January; but the first case in the Bleaching Department did not appear until January 7th, and the maximum week in that department was the 4th week of January. In all the departments, except the dressing, the first case was some time during the first week of January, and the maximum week was in seven departments the second, in one the third, and in one the fourth week of January. In the Bleaching 87% were affected and 75% absent an average of five days; in the Dyeing 80% were affected and 35% absent an average of 6 days; in the Iron Repair shop 75% were affected and absent 7 days; in the Weaving 66% were affected and absent an average of 6 days; in the other departments there were considerably less, and least, with 25% an average of 4 days, in the Spinning.

Medical Returns.

I have tabulated thirteen medical returns from eight different towns in Hampden County. The dates given for first cases range all the way from October 6th in Monson at the south-east extremity of the county, to December 26th at West Springfield and Holyoke in the north-west, and are so varied and unreliable that no conclusion can be based on them. One return from Palmer gives the date of the first case December 1st, but states that influenza did not become general until after Christmas. This agrees with the factory returns and is probably the true interpretation of the medical returns; the maximum weeks given indicate the same thing; as do three different Holyoke returns dating first cases December 1st, December 20th, December 26th, but all giving the first week of January as the maximum week.

Seven returns name the second week of January as the maximum week, five the first week, one the third week. The percentages of affected vary from 75% to 20%, and the average of eleven returns is 44%. One practitioner profited, apparently, but little by the epidemic, as he reports that only one-fourth of 1% among his clients were affected.

Sex.

In this county eleven returns state that males were most affected. One return says: "especially out-door laborers"; one says: "male, those out-doors"; one says: "the careless, and those who tried to keep going every day about their business and work."

Other Diseases.

Eight returns state that pneumonia was increased and one that pulmonary diseases were; three (one from Springfield and two from Holyoke) report malarial complications; one return from Holyoke says it resembled "dengue."

Dr. A. F. Reed, of Holyoke, writes: "Bronchitis was common in most cases, but the most prominent influences seemed to be a union of rheumatic and malarial forces in a hybrid action, and in my experience quinine failed to give as good effects as salicin."

Hampshire County.—From this county I have tabulated thirteen returns from manufacturing companies, employing about 4,000 people. There is one return of a first case, "about December 1st," one December 9th, one December 13th, one December 15th; but the maximum week in all of these returns is the second or third week in January. A factory in Northampton reports its first case January 1st and its maximum week immediately thereupon—the first week of January; but the first case at the Northampton Bank did not occur until January 5th. A silk com-

pany at Florence reports the first case December 9th; but a braid company at the same place reports its first case January 6th and its maximum week the second week of January; the same maximum week as that given by the silk company. From the silk mill 20% were affected and absent an average of eight days, and from the braid mill 25%, an average of four days. Eight returns give the first case between December 25th and January 7th; nine returns name the second week of January as the maximum week, and three the third week. The percentages of those absent from work vary from 60% to 5% and the time about six days.

Medical Returns.

I have tabulated eleven medical returns from seven different towns in Hampshire County. The dates of first cases vary from December 15th to January 1st. From Ware three returns date the first case December 20th, 27th, 28th. From Northampton three returns date the first case December 15th, December 18th, December 29th. One return names the first week of January as the maximum week, but all the others name the second week. One Northampton return gives 10%, one 25%, and one 75% as the proportion of the population attacked. One Ware return says 10%, one 33%, and one 40% as the proportion of the population affected. The Easthampton medical return says 60% of the factory employees, but 40% of other population. The average of ten returns is 39%.

Sex.

These returns throw little light on sex. One return says, both sexes were most affected.

Other Diseases.

Six returns say pneumonia was increased, one specifying lobular pneumonia. One return from Northampton says:

"there was no pneumonia, and all other diseases appeared to be abolished; there was one death from delirium." In regard to this Dr. Seymour, Medical Examiner, reports the following:

"A man, 32 years of age, had influenza at his home in Springfield. He got out of bed, dressed and came to his parents' home here in a state of delirium. He left their house at 2 A.M., and was found wandering about the streets by a policeman, who took him to the station house. There he remained in a wild delirium until 8 A.M., when, as he became silent, the keeper went to visit him and found him dead. I viewed the body and these were all the facts I could ascertain."

Franklin County.—This county, the most northern of the three occupying the breadth of the State, is somewhat less thickly settled and less traversed by railways than the two preceding. The manufacturing returns are scanty, and I have only tabulated one as apparently accurate.

The Russell Cutlery Company at Turner's Falls, at about the centre of the county on the Connecticut River, returns its first case January 6th, its maximum week the second of January, and 33% of its employees were affected and absent an average of 6 days.

Medical Returns.

I have tabulated five medical returns from five different towns. Three returns from the eastern part of the county, from Orange in the centre, Cooleyville at the south and Northfield at the north, give the first cases December 26th, January 1st and December 23d respectively, and the maximum weeks as the second for the first two, and the third week of January for the last respectively. The medical return for Turner's Falls reports the first case December 26th, the return for Shelburne Falls farther to the west reports

the first case November 15th; both of these returns name the second week of January as the maximum.

The percentage of populations affected according to these five returns varies from 75% to 50%, the average is 66%.

Sex.

Three returns state that males, and one that females suffered the more.

Other Diseases.

Two returns state that pneumonia was increased.

Berkshire County.—This county occupies the extreme western belt of the State from south to north. It also is less thickly settled than other counties, and communication between many townships is less immediate and direct than is the case in some of the other counties. There are, however, a good many manufactories within its borders.

I have tabulated returns from 16 factories, employing nearly 5000 people. A company at Housatonic in the southern part of the county, and one at Adams in the northern part, return the earliest first cases, December 25th and December 30th respectively; the maximum week for the former being the first, and for the latter the third week of January. Seven first cases are dated January 1st, two January 6th, one January 7th, one January 8th, one January 15th, one January 18th. One return names the first week of January as the maximum week, four the second week, nine the third week, and one the fourth week. No conclusions as to sex can be drawn from returns in this county. One return says "neither or both."

The percentages of the affected vary from 75% to 5%, with an average of 45%, and of those absent from work from 50% to 3%, with an average of 22% for an average of 5⅝ days.

The Arnold Print Works at North Adams reports "the epidemic did not cause any serious annoyance" among its 146 employees. This is striking, for of the two other manufactories reporting from North Adams one had 50% of its employees absent an average of six days, and the other 25% an average of four days.

Medical Returns.

I have tabulated 16 medical returns from nine different towns in Berkshire County. I am obliged to conclude that they are not of much value in determining the time when influenza assumed an epidemic character in this part of the State. The dates of first cases vary all the way from October 14th at Montville to January 8th at Otis, neighboring towns in the southeastern corner of the county. At Montville the maximum week is reported to have been the third week of November! Evidently again a local outbreak. Two returns from North Adams each give December 15th as the date of the first case, the second week of January as the maximum and 50% as the percentage of population attacked. Of three returns from Williamstown, next to North Adams, two date the first case January 1st, and one December 19th; the maximum week of one of the first two and of the last being the second week, the maximum week of the other being the third week of January. But the returns from Pittsfield are still more perplexing: of five returns, one dates the first case November 20th, one December 15th, one December 17th, one December 27th (this return mentions having seen a case November 27th), one January 5th, and the maximum weeks vary almost as much. From Sheffield in the southwestern corner of the county the first case is reported December 15th, but the maximum week did not arrive until the fourth week of January.

The percentage of population affected vary from 87% to 10%, with an average of 60%.

Sex.

Eight returns state that males, and three that females were more affected; one return says: "men complained the most, because it was their nature to, but women were really as sick."

Dr. S. C. Burton, Chairman Pittsfield Board of Health, writes January 26th:—"In our House of Correction, of which I have medical charge, there were 105 prisoners; of these 96 males, 9 females. Ventilation to the male prisons by windows on the North and South side, to the female prison by windows on the East and West side. The windows in the male prison were open most of the time. The hall man was the first taken sick January 11th, the following day 24 men were sick, the next morning eight were too sick to go to the shop. January 14th twenty more were taken sick, and one or two a day afterwards until the number reached 56, all males—not a single case in the female prison."

Other Diseases.

Nine returns state pneumonia was increased; two that pulmonary diseases were increased; one that capillary bronchitis was increased.

SUMMARY OF GENERAL CONCLUSIONS.

Some of these returns are evidently quite accurate, and some mercantile returns and those of some public institutions, as well as a much smaller proportion of those of physicians, are based upon carefully kept records; other returns are only approximately correct; and still a third and not small class are mere guesses, which gain such value as they possess from the probability that the errors counterbalance each other.

In drawing conclusions I have considered the date of

maximum weeks of more importance than the dates of first cases.

The data furnished for Suffolk County by such sources as the Massachusetts and City Hospitals, the State Prison, the Post Office, the two large private banks quoted, are probably pretty accurate; as are the returns from the Pacific Mills (Cotton and Prints) Lawrence, Essex County, 4200 employees, and from the Pemberton Cotton Mills at the same place, and from the Merrimack Mills (Cotton and Prints) Lowell, Middlesex County, 3200 employees, and from the Bigelow Carpet Mill, wools, Clinton, Worcester County, 1050 employees; and from the Palmer Duck Company, Hampden County, 325 employees.

From these, collated with the mass of less evidently reliable returns which I have tabulated but not read, one may, perhaps, conclude that:

I.—Influenza appeared first in epidemic form at Boston and its immediate vicinity; that the epidemic dates there from the middle of December, although there were sporadic cases earlier; that it culminated during the week between December 28th and January 4th; that it began to decline pretty rapidly from that date, although its after effects still exhibit themselves in many forms.

II.—That the epidemic was from ten days to two weeks later at the Island Counties (Nantucket and Dukes) than at Boston; that it was about a week later in Barnstable and Bristol Counties; and a few days later, perhaps, in Plymouth and distant parts of Norfolk Counties.

III.—In the northern parts of Essex and Middlesex counties the epidemic was from five days to a week later than at Boston. Most of the towns reporting in these counties—especially in Bristol, Essex and Middlesex—are in constant, rapid and easy communication with Boston by frequent and crowded daily trains.

IV.—It is difficult to explain why these counties were

attacked later than Suffolk, and at the same time why Nantucket and Dukes were attacked still later than these counties. Neither a miasmatic wave, nor contagion, nor yet the two combined—as we understand them—cover all the observations.

V.—The epidemic, apparently to some extent, radiated out from Boston as a first centre. That it behaved in the same way with regard to the surroundings of other centres of population—notwithstanding the suggestive report of the Medical Examiner at Ayer Junction, and notwithstanding similar propositions made elsewhere—I cannot satisfy myself from these returns. Except as a larger centre of population it is not apparent why Boston should have been attacked before other points as far east on the coast; as a centre of population it is not apparent why it should have preceded New York; and neither geographically nor as a centre of population why it should have anticipated London.

VI.—With many puzzling local variations, backward and forward, and many contradictions, the returns indicate a later development as we proceed westward in the State, until in Berkshire County we find the epidemic developed fully two weeks later than in Suffolk; several days (4 to 5 days) later than in Worcester; and about as much later than in the two Island Counties to the extreme east.

VII.—To judge from the returns of public institutions and of manufacturers, at least forty per cent. of the adult population was seriously enough affected to have occupation interfered with. The medical returns, which necessarily are often guesses, agree with this. A considerably larger percentage probably was attacked.

VIII.—The returns from two maritime counties indicate that exposure to atmospheric influences was an important factor, and men were more affected. On the other hand, where men and women were equally confined within doors by their work, as in mills, the women were both more seriously and more numerously affected.

IX.—Returns from the McLean Asylum, the Massachusetts Hospital, the Boston Children's Hospital, the Tewksbury Almshouse, indicate that officers and nurses were more attacked than patients, an observation which corresponds with others elsewhere, here and in Europe.

X.—In studying the returns of different mills one meets with singular cases of immunity from or predisposition to the epidemic. It is a curious anomaly, that one cotton mill should have less than half of one per cent. of its employees affected, and another 60%; that a silk mill should have 60% affected, a woolen mill in a contiguous township 15%, and a cotton mill in the next township 6%. The percentage of affected at several of the woolen mills is quite small, but this is not invariable, at others it was as high as 40%.

At Print Works there was a great variation in the percentages in different departments. From the Merrimack Manufacturing Company of Lowell, which kindly sent me special figures, I learn that the "departments having a hot, moist atmosphere were subject more severely to the effects of the disease, which was also more prevalent among the women and boys than among the men. The high percentage of the color shop (16%) was due more to the unhealthy nature of the room (which is cold and very draughty) than to the noxious influence of the chemical fumes. Such places as the print room (one case out of 55), indigo dye house (no case out of 20), laboratory (no case out of 12), where the fumes from the drugs and chemicals are most conspicuous, were, comparatively speaking, free from any attack by the epidemic."

At the paper mills, where many operatives are exposed to a warm, moist atmosphere, the percentage of affected was, as a rule, low. How far this was accidental, or how far due to chloride of lime or other materials used in bleaching, may be queried. At the bleacheries of Print Works

about 30% were attacked. At the bleaching room of the Palmer Duck Company 87% of the employees were attacked.

The Arnold Print Works at North Adams reports that the epidemic "did not cause serious annoyance"; whereas the Greylock Mills (woolen) at the same place reports 75% attacked, and 50% absent from work an average of 6 days.

The Merrimack Print Works (all departments included), Lowell, had 18% affected; the Pacific Mills Print Works, Lawrence, had 29.50% affected; the American Print Works, Fall River, had 33% affected.

XI.—Pneumonia was undoubtedly much increased in frequency during the influenza period all over the State. As to the character of the pneumonia—whether lobular or lobar; croupous, fibrinous or catarrhal; whether mistaken for capillary bronchitis—these returns give little information, and one must consult special papers—such as those read April 17, 1890, before the New York Academy of Medicine by Drs. F. C. Shattuck, E. G. Janeway and William Pepper.

XII.—Some of the returns indicate that the presence of epidemic influenza was inimical to ("drove out") other forms of disease—as diphtheria and scarlet fever.

In the Connecticut River Valley, as might have been anticipated, it seems to have taken a malarial character.

XIII.—To fit the mode of progression of the atmospheric disease wave—if the epidemic was dependent upon a miasmatic poison—with recorded observations in Europe and America, will tax the utmost ingenuity of the scientific meteorologist.

XIV.—The epidemiologist will be quite as much perplexed if he seeks to explain all the phenomena by contagion.

I have endeavored to collate carefully returns as made, and to follow honestly where they seemed to lead without prejudice and without regard to previous mental predispositions. When the returns seemed to offer no exit I have said so. Some errors have doubtless crept in, and some obvious lessons may have been overlooked. The picture, however, has not been varnished at the expense of truth.

The results are meagre enough, but they have yet to be compared with others before we quite despair of reaching some definite knowledge of epidemic influenza. The bacteriologist has failed to help us, and we must still struggle with the intricate problems presented without the aid of a specific micro-organism.

Under date of January 5, 1890, Hirsch, the distinguished Berlin epidemiologist, writes in answer to the editor of the Deutsche Medicinische Wochenschrift:

. . . . . "I am persuaded that the present epidemic differs in no essential particular from those hitherto described. The great interest which the outbreak of this disease has excited is to be explained simply by the indifference of the great mass of the medical public to every thing taught by history. . . . . .

"Whatever I had to say about Influenza I have said in the second edition of my historico-geographical pathology, and nothing new has presented itself."